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The role played by Frederick Taylor in the rise of the academic management fields

Frederick Taylor

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437

Abstract

Purpose – The purpose of this paper is to analyze how Frederick Taylor's achievement as the originator of a science of work provided a theoretical foundation for first generation academic management programs in the Progressive era. The paper aims to show the implications of this match for Taylor's continuing high position in the history of management thought.

Design/methodology/approach – A methodology is used involving analysis of published and unpublished historical sources including Taylor's own work, writings from his contemporaries, and writings from key figures in first generation university public- and business-management programs.

Findings – The paper gives evidence of the impact of Taylor's work on management education in the Progressive era and the implications of this impact for Taylor's reputation and the management programs themselves.

Originality/value – The analysis uses a wide variety of published and unpublished sources. It compares educational developments in the public and business management fields which are generally analyzed in separate literatures.

Keywords Public administration, Scientific management, Taylorism

Paper type Research paper

Frederick Winslow Taylor (1856-1915) ranked first among the field's historical pioneers in Wren and Hay's (1977) survey of management historians. Waldo (1948) argued that Taylor's ideas were the key influence in the formation of public management thought. The aim of this paper is to celebrate Taylor's achievement as the progenitor of a science of work whether in the public or private sphere. His commitment to a work science led directly to building a management profession even though his tenure at the apex of management thought has always provoked controversy. In his own day, an American Society for Mechanical Engineers sub-committee noted that he attracted enthusiastic advocates and vigorous opponents (Sub-committee on Administration, 1912). Many contemporary writers disdain Taylor's work for retarding the development of democratic workplaces (Braverman, 1974). Yet other analysts argue that Taylor's goals gave workers opportunities to develop their personalities (Fry, 1976; Locke, 1982). Drucker (1954) labeled Taylor's scientific management the most lasting American contribution to Western thought since the eighteenth-century Federalist papers.

What's of interest in the contemporary debates is that Taylor still incites contention so many years after his death. In the late 1800s, he was one of several people who presented papers at American Society of Mechanical Engineers (ASME) meetings on how to use wage incentives to motivate labor. Few, if any, people today weigh the benefits or dysfunctions of ideas developed in the other presentations – Partridge (1887), Towne (1888), or Halsey (1891). Yet, Taylor's reputation endures in the academic management literature, the undergraduate management curriculum, and in the popular



imagination. Articles on his work have appeared in general management journals (Hough and White, 2001; Wagner-Tsukamoto, 2007; Wrege and Perroni, 1974; Wrege and Stotka, 1978) as well as those devoted to management history (Wagner-Tsukamoto, 2008). He is also credited in the academic literature for setting a base from which his “students” such as Frank and Lillian Gilbreth launched shop management into new and invigorating directions (Mousa and Lemak, 2009).

Most basic undergraduate management textbooks allow at least several paragraphs to profile Taylor’s contributions and the controversies surrounding them (Bateman and Snell, 2009; Griffin, 2008). Many introductory organizational behavior textbooks provide the same type of material (George and Jones, 2008). A popular trade-press biography of Taylor appeared at the end of the twentieth century (Kanigel, 1997).

Sustained interest in Taylor’s work does not lie primarily in the specifics of his wage plans. Most references to his name in contemporary management literatures are not concerned with whether his differential piecework incentives for individuals were better for industry than Towne’s gain-sharing for all workers on a particular job. His interest lies in his proposal to create a management science to analyze work. The earlier ASME papers based their incentive plans on traditional job times. Taylor (1895) was the first to propose doing experiments to discover how long a skilled worker should take to do a job if the right materials and guidance were available. His key innovation was to consider factory work a subject worthy of systematic study in the same way that traditional professions such as medicine required study. By proposing the notion that effective management required expertise, Taylor aligned his work with the Progressive era quest to improve efficiency through knowledge (Haber, 1973). He offered management as a profession – what Larson (1977) has called a career centered on a body of knowledge – rather than an enterprise dependent for success on luck or a strong personality.

To see how Taylor came by his ideas and strove to publicize them, the article offers a short biography. It then analyzes the function that Taylor’s scientific management served for burgeoning university programs in social science, public administration, and business management, and how the alliance between these university programs and Taylor’s shop management affected both entities. The aim is to show what role Frederick Taylor’s ideas played as one input into the rise of the academic management fields.

Early biography

Frederick Winslow Taylor was born into a wealthy Philadelphia family in 1856. After graduating Philips Exeter, he decided to become an apprentice at Enterprise Hydraulic Works even though he had passed the entrance exams for Harvard University. Subsequently, he worked as a journeyman and supervisor at Midvale Steel Company, and as general manager of the Manufacturing Investment Company (a paper products firm), and tried to increase productivity at both firms. When he encountered difficulties motivating the workers, he came to believe that managers lacked the information that they needed to get their jobs done. This insight led him to try to increase the information available to managers through time study, i.e. timing operations necessary to complete individual factory tasks. He became convinced that time and motion based experiments could teach managers more efficient production methods. They would learn when and

how to change tools or materials to get larger outputs, and that they could then use this knowledge to train workers (Taylor, 1947a, b). Frederick Taylor

The key to the new approach was to put new responsibilities on the manager's shoulders; they had to learn more efficient methods so that they could train workers and give adequate feedback on performance. The type of information managers needed ranged from the purely technical, e.g. best speed to run a machine tool for cutting metal, to the psychological, e.g. understanding the impact of employee fatigue. As economist Commons (1934) has noted Taylor's approach required information on improving human capacity and inducing greater willingness among employees. His approach stressed the importance of work measurement.

Adequate feedback required functional supervision. In Taylor's schema, each worker has a gang boss to supervise putting the material on the machine, a speed boss for the machine operation itself, a repair boss who takes care of the apparatus, and an inspector who checks quality. When shop management succeeds, managers and workers cooperate with each other because both parties see that they can gain through increased production.

To share this approach Taylor became a consulting engineer in 1893. Soon his clients included the Simmonds Rolling Machine Company in Massachusetts as well as Cramps Ship and Engine Building Company and Bethlehem Steel Company in Pennsylvania among other firms. Insights, he gained consulting appeared in his 1895 ASME paper and his 1903 book, *Shop Management* where he stressed the importance of the planning function, including the inauguration of planning departments, and increased vertical communication and feedback (Taylor, 1947a).

Scientific management

Taylor's ideas received intense publicity in 1910 after the railroads east of the Mississippi petitioned the Interstate Commerce Commission (ICC) for permission to raise their rates. Progressive lawyer Louis Brandeis, an unpaid counsel for the Trade Association of the Atlantic Seaboard, argued that the ICC should refuse the railroad request on the grounds that the train companies would not need to charge more if they adopted Taylor's ideas to improve their productivity (Savino, 2009). Among the most lasting favors, Brandeis did Taylor was labeling his ideas as "scientific" rather than "shop" management – a phrase that instantly caught Taylor's (1947b) own fancy and which he used in the title of his next book, *The Principles of Scientific Management*. The new appellation highlighted the experiment based nature of Taylor's approach, his intent to find widely usable principles for increasing productivity. As Taylor (1912, p. 36) later explained, "there is a best way in doing everything, and that [...] best way can always be formulated into certain rules." When such rulemaking takes place, "you can get your knowledge away from the old chaotic rule-of-thumb knowledge into organized knowledge."

Between 1901 and 1915, Taylor's associates introduced at least some part of his ideas into at least 200 American businesses (Nelson, 1992a). In most cases, employee earnings rose while fewer judgments depended on the personal evaluations or biases of supervisors. But, this period also saw the rise of two threats to Taylor's system. First, skilled craft unions, particularly the International Association of Machinists, emerged as opponents of shop management which they categorized as a ploy to train low wage earning workers to do skilled jobs and so displace their own members (Schachter, 1989).

Second, some efficiency engineers borrowed aspects of Taylor's system, principally time study, without accepting a need to foster cooperation between managers and workers – by giving both parties gains from any productivity increases. During this period, Taylor disassociated himself from the work of efficiency consultants such as Harrington Emerson who used time study as a means to institute rate cuts (Nelson, 1992a). Taylor (1910) told an associate, Morris Cooke, that Emerson and his ilk were about the worst thing that could happen to shop management.

In 1911, a botched, authoritarian attempt to use parts of Taylor's system to reorganize work in the Watertown arsenal led to a strike by foundry workers (Aitken, 1960). The International Association of Machinists immediately asked Congress to investigate the use of Taylor's time study methods in public organizations. William Wilson, chair of the House Labor Committee – and a former United Mine Workers official – formed an investigating commission. A set of hearings ensued which lasted from October 1911 to February 1912. Taylor (1947c) gave over 12 hours of testimony to the congressional committee. This forum provided an excellent sounding board to impress public opinion. In his testimony, he placed management-worker cooperation at the heart of his methodology. Scientific management, he explained was not an efficiency device but rather a mental shift for employers and employees where they stop worrying about dividing a surplus and cooperated instead to make that surplus grow. He argued that labor leaders opposed his work because they had been hurt by managers who used time study to cut rates – a practice he opposed.

The committee concluded that no evidence existed that scientific management injured workers and allowed its use in government facilities. However, the story did not end there. Subsequently, Representative Frederick Dietrick, from the Watertown Arsenal district, put a rider on a 1914 Army and Navy Appropriations Bill to stop time and motion research in arsenals. Thus, Taylor's techniques came to be equated by some people with authoritarian leading and anti-labor attitudes (Schachter, 1989).

Frederick Taylor died of pneumonia in 1915 leaving his followers to justify his ideas including the importance of management study. To this end Harlow Pearson, director of the Amos Tuck School of Administration and Finance at Dartmouth University, and others committed to scientific management inaugurated the Taylor Society. Its stalwarts would try to keep alive Taylor's (1947a, p. 63) dictum that management must "rest upon well recognized, clearly defined and fixed principles."

Taylor and the universities

All bodies of specialized knowledge are influenced by the social context in which they are produced (Mulkay, 1972). Taylor's work coincided in time with a major expansion of college education and concomitant attempts to enlarge the universe of occupations accorded professional or semi-professional status. While America's college enrollment was basically static from 1820 to 1880, it grew by 20 per cent at private Eastern colleges and 32 per cent at state institutions between 1885 and 1895. This expansion included the introduction of more middle class students who came to college not simply to acquire learning for learning's sake but who wanted to acquire knowledge that they could use in subsequent employment (Larson, 1977). By the turn of the twentieth century, colleges were re-organizing to accommodate these students (Nichols, 1912).

One aspect of this re-organization involved the development of social science departments. Dedicated to expanding knowledge about different facets of social life, these

departments had a natural affinity to Taylor's call for systematic study of management issues. At the same time that Taylor was honing his ideas in the factory or through his work as a consultant, social science professors – in the elite universities – had founded professional organizations such as the American Economic Association in 1883, the American Academy of Political and Social Sciences in 1889, the American Sociological Association in 1903, and the American Political Science Association in 1903 to champion systematic research that could help solve real social problems (Ross, 1991) – the same approach to progress that Taylor advocated in the factory. Editors of social science journals and journal issues corresponded with Taylor asking him to create articles for their publications or suggest associates who would do so (King, 1912; Rowe, 1911).

Leaders in the political science and economics fields were allied with urban reformers who wanted to professionalize government work. In fact, one historian has argued that the central goal of the social science movement was to establish civil service systems (Sass, 1982). The reformers were receptive to Taylor's call for a work science because they saw it as a possible antidote to city government inefficiency and lack of responsiveness to public needs. It undergirded their notion that merit rather than political connections should be the entrance voucher for public employment.

In the first 15 years of the twentieth century, major elite universities did not yet offer either undergraduate or graduate professional public administration programs although the American Political Science Association helped fund a Society for the Promotion of Training for the Public Service that campaigned for such offerings (Schachter, 2007). The New York Bureau of Municipal Research Training School founded in 1911 was the first program dedicated exclusively to educating public servants. Its students were college graduates and some had advanced degrees. The program had ties to scientific management and used Taylor's book as part of the curriculum (Dahlberg, 1966). Taylor came by to talk to students and staff several times as did Henry Gantt, his associate from the consulting days at the Simonds plant and Bethlehem Steel (Van Riper, 1995). One of the school's executives, Frederick Cleveland lauded the importance of scientific management for two reasons. First, it would show public sector officials how to use information to plan; Cleveland (1912, p. 331) foretold that with this new tool "we shall have a planning executive as well as a planning legislature." Second, it would enhance democracy by showing citizens how to take a new role in politics; once they had information, they could compare the efficiency of different approaches to police or street paving work. Stone and Stone's (1975) history of early public administration education lauds Taylor as a founder of the field because of his emphasis on using analysis rather than intuition to solve organizational problems and his stress on careful training of employees. When universities started offering public administration programs after World War I, their curricula maintained an emphasis on scientific management (Schachter, 2007).

Business schools

Another aspect of re-organization or expansion involved the creation of university-level business schools. In 1897, America had one college-level business school – the Wharton School at the University of Pennsylvania. Its curriculum was predominantly composed of courses in applied economics, accounting, and business law (Hotchkiss, 1918). By 1917, the country boasted 30 business programs (Sass, 1982). These newly created business schools were also receptive to Taylor's approach. They saw scientific management as

lending respectability to their field which had at least two sets of powerful detractors. Many of their liberal arts colleagues patronized the business curriculum as trade school work, akin to the matter taught at secretarial schools. At the same, business leaders argued that success in business could not be taught but rather had to be learned in the field (Marshall, 1913). Taylor's idea of a science of work helped counter both objections. It posited that management was a theoretically rigorous discipline which initiates could learn and then use to further commercial development. As Donham (1952, p. 11) noted, business administration faculty had always been committed "to the thesis that business administration should be treated as a profession." But, before it could become a profession in the league of the ministry, law, or medicine, business education needed a literature and a body of principles; Taylor's scientific management supplied both requisites (Donham, 1921).

In the business field, elite schools led the charge in putting shop management in the curriculum. In 1908, Edwin Gay, the first dean of Harvard University's School of Business, had to decide what to teach in a business curriculum and how to teach it (Donham and Foster, 1930). An early decision was to invite Taylor and his associate, Carl Barth, to give a series of lectures to students as part of a course Gay was teaching on industrial organization. At first Taylor demurred; he believed that the factory was the best place to learn shop management because in his estimation "Workmen can only be studied side by side and shoulder to shoulder" (Taylor, 1909, p. 86).

It took persistence and persuasive communication on Gay's part to get Taylor to accept the proposition (Copeland, 1958). In May 1908, Gay and Wallace Sabine, dean of Harvard's Graduate School of Applied Science, went to Boxley, Taylor's Pennsylvania home, to press their cause. Taylor at first refused but finally gave a grudging acceptance to the request of his visitors (Cruikshank, 1987). A subsequent letter to Gay shows, however, that he still had doubts as late as 1913 about the usefulness of college courses on scientific management because he considered that "one trouble with the man who has had a very extensive academic education is that he fails to see any good coming to him from long continued work as a workman" (Taylor, 1913). A Taylor biography says that Gay persuaded him to lecture by threatening to give a course on the Taylor system with or without its founder – knowing full well that Taylor would not want to see anyone else misrepresent his ideas (Copley, 1923, p. 290). Gay's biographer calls this farsighted action on Gay's part "the ensnaring of Frederick Winslow Taylor and his little band of associates" (Heaton, 1952, p. 72).

The introduction of scientific management methodology proved a success; Taylor received a positive reception. A Harvard faculty member noted that his lecture was popular because "it seemed to provide something of a formula for management," a scientific underpinning for the field (Copeland, 1958, p. 26). Gay repeated the invitation in 1909 and Taylor returned to Harvard every year until he died. While, Taylor was at Harvard, Gay and other faculty members sat up nights with him at Harvard's Colonial Club discussing how scientific management could produce fundamental business principles (Hanford, 1954).

Clarence B. Thompson, a Taylor associate, also taught at the business school. He produced books and articles that helped develop an underlying scholarly literature for the field (Thompson, 1913, 1914). Arch Shaw, a Chicago publisher who had studied Taylor's methods, took a sabbatical from business and came to teach at Harvard in 1910 (Cuff, 1996). He argued that Taylor's work "marks the beginning of the present

movement to establish industrial management as a profession subject to scientific laws” (Shaw, 1914, p. 217). He developed a textbook based on his Harvard course materials that calls the premium on efficiency found using Taylor’s methods “unfailing and absolute” (Shaw, 1916, p. 73). The text notes that Harvard’s business school uses Taylor’s ideas to analyze organizations the world over and to identify those methods that achieved favorable results (p. 223).

In 1914-1915, the school offered a course specifically entitled “The Taylor System of Management.” When skeptical professors outside the business school, asked Gay if management could be a profession, the dean sent them Taylor’s work to prove the point (Cruikshank, 1987). In October 1919, when the Taylor Society held its annual meeting under Harvard University Graduate Business School auspices attendance surpassed that of the organization’s previous gatherings (Braverman, 1919).

Morris Cooke, one of Taylor’s closest associates, lectured at Dartmouth University’s Tuck School of Administration and Finance which offered courses in scientific management including a time and motion studies laboratory, and factory field work in applying Taylor’s principles (Aitken, 1913). Person (1907), the school’s director, believed that America needed to upgrade its business education if the country wanted to compete at the apex in international trade. He persuaded Cooke to develop a scientific management conference for the school at which Taylor spoke; the conference attracted over 300 participants including business executives and educators in public and business administration (Nelson, 1992b). These activities led a Carnegie Corporation study to note that the “Tuck School probably went further than any other institution in the prewar period in putting its work on a demanding intellectual level” (Pierson and Others, 1959).

After 1915, business school professors joined the Taylor Society in large enough numbers to establish its character as a progressive, avant-garde outpost of business thought. As Taylor Society president in 1917, Person (1917, p. 6) noted that scientific management needed the professor’s point of view alongside that of managers and workers. The professors’ value lay in their expertise in industrial progress and their ability to examine the organization from outside which was “a good principle of investigation and valuation.” In 1991, Person left academia to become the first paid managing director for the Taylor Society. In the 1920s, he helped to draw professors to the organization whose analysis of labor and personnel issues helped to mute organized labor’s opposition to scientific management (Nelson, 1992b).

Scientific management in the business school milieu

Taylor’s work entered the curriculum just as college education was becoming a prerequisite for managerial and professional success. It was a marriage with advantages for both sides. Shop management gave business classes a principles based foundation although even after its introduction debates continued over whether business education had a well-defined theoretical base (Pierson and Others, 1959). The university milieu in turn provided a vital strategy for spreading Taylor’s message in a way that would not have been possible if his innovations had remained in the factory as he had originally proposed. Prominent professors such as Marshall (1921) at the University of Chicago or Lansburgh (1923) at the University of Pennsylvania wrote articles and books which publicized his ideas. Students who learned about his ideas in class used his insights throughout their careers. Hotchkiss (1918, p. 65), director of business education at the

University of Minnesota during World War I and dean of the Stanford Business School after 1925, understood the trend when he noted that:

[...] in the long-run the most permanent, influence making for the extension of scientific method in business has been the new viewpoint from which universities have been approaching the tasks of educating men for business.

The academic venue for post-Taylor scientific management influenced its presentation. Taylor's books contained hints that a work science can only give provisional answers at any given time that a procedure that seems the one best way on Monday may fall to a better procedure after further suggestions and experiments on Tuesday (Taylor, 1947b, p. 128). Academic management specialists further stressed this provisional nature of shop management findings. As Dartmouth's Person (1912, p. 7) noted, "in the derivation of laws there is no assumption of finality [...] there is always the probability of further important discovery of new laws, and observation and experiment do not cease." Harvard's Donham (1952) argued that you had to constantly improve any intellectual framework. This stance assumed a continual need by business for outside researchers to enter plants and do experiments. It assumed a long-term *raison d'être* for an academic management enterprise that would have a primary loyalty to analysis rather than the traditions of any given firm.

Eventually, the stress on knowledge's provisional nature had certain negative implications for Taylor's place in the university canon. If knowledge accumulates over time and our understanding of social phenomena improve, then in any scientific enterprise, later formulations should surpass early ideas. As early examples of management thought, Taylor's ideas became foils in some academic writings to later analyses on how to motivate workers and improve efficiency (Ramos, 1972; Scott and Hart, 1973). In some cases, an unintended consequence has been that contemporary academic literature under-appreciates Taylor's scope because of the date of his compositions. Boddewyn (1961) notes that many works report that Taylor did not analyze worker group relations although his works actually contain examples of the role groups play in productivity outcomes. Nyland (1995) notes those writers who sometimes fault Taylor for not recognizing the importance of shortening hours to counter worker fatigue and who suggest that the idea of shorter hours emanates from later work. In fact, Taylor's writings are replete with experiments that show the positive impact shorter hours can have on output. Although inaccurate, a critique of Taylor as not realizing the importance of short hours validates the notion that later management theorists are more humane and holistic than earlier ones and that therefore management thought approximates an ever more accurate scientific continuum.

The question can be asked: how can professors of management change their pedagogy so that a more accurate picture of Taylor emerges for future generations and his work is not unfairly denigrated simply for having an early publication date? The easiest answer would be to ask students to read widely in Taylor's works rather than simply learning about him from secondary sources. Given the time constraints on students and practicing managers this solution is unlikely to be implemented widely. A second approach then is to put more emphasis in university-level courses on management history. This strategy could require reading of analytical surveys of the history of management theory as exemplified in Wren's (2005) *The Evolution of Management Thought*. Wren's analysis

concludes that Taylor had a systematic approach to management and a philosophical framework that did not neglect the human element. Frederick Taylor

Conclusions

This paper shows some of the impact Taylor's work had on the rise of management education. In Taylor's day, the notion of a work science was strange; as Halsey (1891, p. 886) noted at the ASME, it could bring the "danger of expensive errors of judgment." Today, on the other hand, the dominant assumption is that lack of analysis is more likely to incur such expensive errors. At least partly because of Taylor's influence, the idea that one can study organization and management, and thus make better practical decisions is the recognized wisdom. Business administration programs are important offerings at almost every university; few people argue anymore whether this subject belongs in a college curriculum.

This shift does not imply that the professionalization of management has not been without controversy even in the academy itself. Debates on the professionalization of management continue in terms of the role of intuition in management, and the impact of professionalization on inclusiveness and representativeness. Does professionalizing management turn it into an elite enterprise shutting the door on people who could have become managers in a different schema or paradoxically does it actually allow new groups to enter? But the most intensive and productive of such debates today take place among people with management PhDs – rather than among engineers at the ASME conventions. As one person responsible for this shift in debate venue and as a progenitor of the idea that all work is worthy of study, Taylor has certainly left his footprint on the landscape of management thought.

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